GUAM ENVIRONMENTAL PROTECTION AGENCY

POST OFFICE BOX 2999 AGANA, GUAM 96910 TELEPHONE: 646-8863/64/65

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Ms. Doris Lee-Betuel
Guam Project Officer
Office of Territorial Programs
U.S. Environmental Protection
Agency, Region IX
215 Fremont Street
San Francisco, California 94105

Dear Doris:

Enclosed for your information is the Guam Water and Energy Research Institute's project plan investigating surface and groundwater contamination from Ordot Landfill. Also enclosed is an aerial photograph denoting proposed monitoring well locations around the Landfill which will be used for sample collection.

If you have any questions or require further clarification, please do not hesitate to contact me.

Sincerely yours,

JAMES L. CANTO
Head, Air and Land
Programs Division

Enclosures

1985

SYNOPSIS

a. Number: 03

b. Title: An Investigation of Surface and Ground Waters in the Vicinity of the Ordot Landfill for Hazardous Organic Materials.

c. COWR Category: 05B

d. Keywords: Leachates, Organic Compounds, Landfills, Water Pollution Sources, Stream Pollution, Groundwater Pollution, Hazardous Materials.

e. Duration: October 1, 1984 to June 30, 1986

f. Fiscal Year 1985 Federal Funds: $45,094 47,875

g. Non-Federal Funds: $26,781

h. Name and University of Principal Investigator:

William J. Zolan
University of Guam

i. Congressional District: Not applicable.

j. Statement of Critical Regional or State Water Problem:

An investigation of surface and groundwater quality in the vicinity of the Ordot landfill is needed to assess of the possibility that landfill lechate may contain hazardous organic compounds. The landfill has been in continuous use since at least the 1930s and it is not known what materials have been deposited there. The Lonfit River lies less than 500m downgradient from the landfill site. If hazardous lechate is reaching the river water via surface and subsurface migration, fish, shrimp and other organisms of the river may be contaminated. Shrimp and possibly fish are taken for consumption by local inhabitants.

k. Statement of Results, Benefits, and/or Information Expected:

The primary benefit of the study will be the identification of any major water pollution problem with regard to the Ordot landfill. If a major problem is discovered, it is anticipated that the local Guam Environmental Protection Agency (GEPA) will seek additional federal funding to alleviate the dangerous situation. A secondary benefit will be that the construction of the groundwater wells will allow future monitoring of the groundwater lechate by government agencies (GEPA, USGS).

PROPOSAL

1. Nature, Scope, and Objectives of Research:

The objectives to be achieved by this project include 1) identification of any major water pollution problem originating from organic compounds leaching from the Ordot landfill and 2) installation of a set of groundwater wells downgradient from the landfill site to allow for future studies and/or monitoring by other government or private agencies.

II. Related Research:

The Council on Environmental Quality (1981) has identified the magnitude of the problem facing the United States with respect to the disposal of chemical wastes in uncontrolled dump sites such as the proposed study site on Guam. The major pathway of toxic compounds reaching groundwater via lechate has been investigated extensively, particularly in those states where major groundwater aquifers have been contaminated from current or abandoned landfills (CEQ, 1981). Page (1981),in a study of 56 toxic compounds in New Jersey surface and groundwater, documented the fact that groundwater contamination frequently mimics the pattern of surface water contamination.

A study similar to the proposed study was conducted in Hawaii at the Kapaa landfill site on Oahu (Chun and Dugan, 1981). Groundwater lechate as well as surface migration of possible contaminants was investigated. The main concern in the study was possible affects of landfill lechate on a marsh habitat. Groundwater wells were dug to sample leachate in subsurface waters. However, no effort was made to identify organic compounds other than phenols.

In 1982, a team of investigators under contract to the Environmental Protection Agency conducted a brief (two day) survey of the Ordot landfill (Black and Veatch Consulting Engineers, unpublished). Samples of surface water, well water and soils were collected and analyzed (off-island) for the EPA priority list of pollutants. The results showed contamination by at least 12 organic compounds. However, the results were not confirmed by replicate analyses. Blanks also showed organic contamination (methylene chloride). The final report from this brief survey stated that the potential "does exist... for the landfill to become a major source of pollution". However, the investigators felt that no major immediate problem existed. Given the conflicting analytical results, the limited scope (no groundwater or ground lechate was collected), and the short duration, most environmental officials in Guam question whether the problem has really been investigated adequately.

The Territory of Guam's 208 Water Quality Management Plan (GEPA, 1979) identifies the possibility of hazardous lechate from the Ordot landfill as a major concern.

Recent literature on landfill studies with regard to the water pollution problem addressed by this project include Absolon (1980), Tester et al (1982), Falco et al (1982), Pawley (1982), and Straub and Lynch (1982, 1982).

n. Methods, Procedures, and Facilities:

The proposed study will answer the question "Are hazardous compounds leaching from the Ordot landfill toward the Lonfit River"? To accomplish this, the groundwater and lechate downgradient from the landfill have to be sampled and analyzed. The project proposes to drill wells into the downgradient slope facing the Lonfit River to collect groundwater for analysis of EPA priority pollutants. Once sufficient wells have been placed it may also be possible to characterize the rate and direction of subsurface water movement. River water, surface water, sediment, surface leachate, and biota samples will be collected from the most likely affected areas to see if surface contamination already occurs. Control surface samples will be collected from a similar habitat removed from the landfill.

The project is proposed as a two year project to allow sufficient sample collection over wet and dry seasons. Precipitation, which would affect lechate movement, occurs seasonally on Guam with average monthly totals ranging from less that 4 inches to over 16 inches depending on the time of year. Samples of groundwater will be analyzed monthly unless more frequent analyses are warranted.

The primary analyses of water samples for organic compounds require the use of gas chromatography. Standard Environmental Protection Agency approved methodologies will be used to analyze the samples for selected priority pollutants using gas chromatography with electron capture, flame ionization and nitrogen-phosphorous detectors. Confirmatory mass spectroscopy analyses, if required, will be done by an off-island consulting laboratory as there are no mass spectrometers on Guam. Where applicable, infrared spectroscopy will be used to identify hydrocarbons. Other basic water quality parameters such as ph, total filterable residue, and chemical oxygen demand will also be determined to give an overall view of groundwater quality downgradient from the landfill site. Suitable groundwater control stations will be included; at least one well will be placed upgradient from the landfill site. Water analyses will be conducted at the Water and Energy Research Institute water analysis laboratory.

At the project's completion it is anticipated that some of the groundwater wells drilled during this project will be incorporated into the Guam Environmental Protection Agency water monitoring program. If hazardous conditions are found to currently exist, it is anticipated that the same agency will seek additional federal funding to alleviate the problem.

o. Progress Review:

During the period since funds have been available (October 1, 1984 through present), equipment and supplies have been purchased although

some have yet to arrive on Guam. Delays caused by the lag time in shipping and procuring supplies coupled with processing of paperwork have caused a set back of 2 to 3 months in getting the laboratory ready and wells in place. These problems have now been surmounted. It is expected that all wells initially planned will be in place by mid April 1985. It is also expected that the gas chromatograph will have been installed by that time.

A training session with the organic section of the Sanitation and Radiation Laboratory of the Department of California Health Services was completed (October-November, 1984) by one of the persons who is taking part in the project. The topic of the training session was analyses of water samples for organic compounds utilizing gas chromatography.

Aerial photographs to allow accurate mapping of and placement of the wells have been completed.

p. Expenditures: See attached budget.

q. Investigator's Qualifications: See attached vita.

r. Training Potential:

No student will be trained on this project. However, two full-time laboratory staff members will be trained in the operation of the gas chromatograph.

Literature Cited

Absolon, A. 1980. Contamination of water caused by landfill refuse disposal. Geoind. N. P. (30) 6.

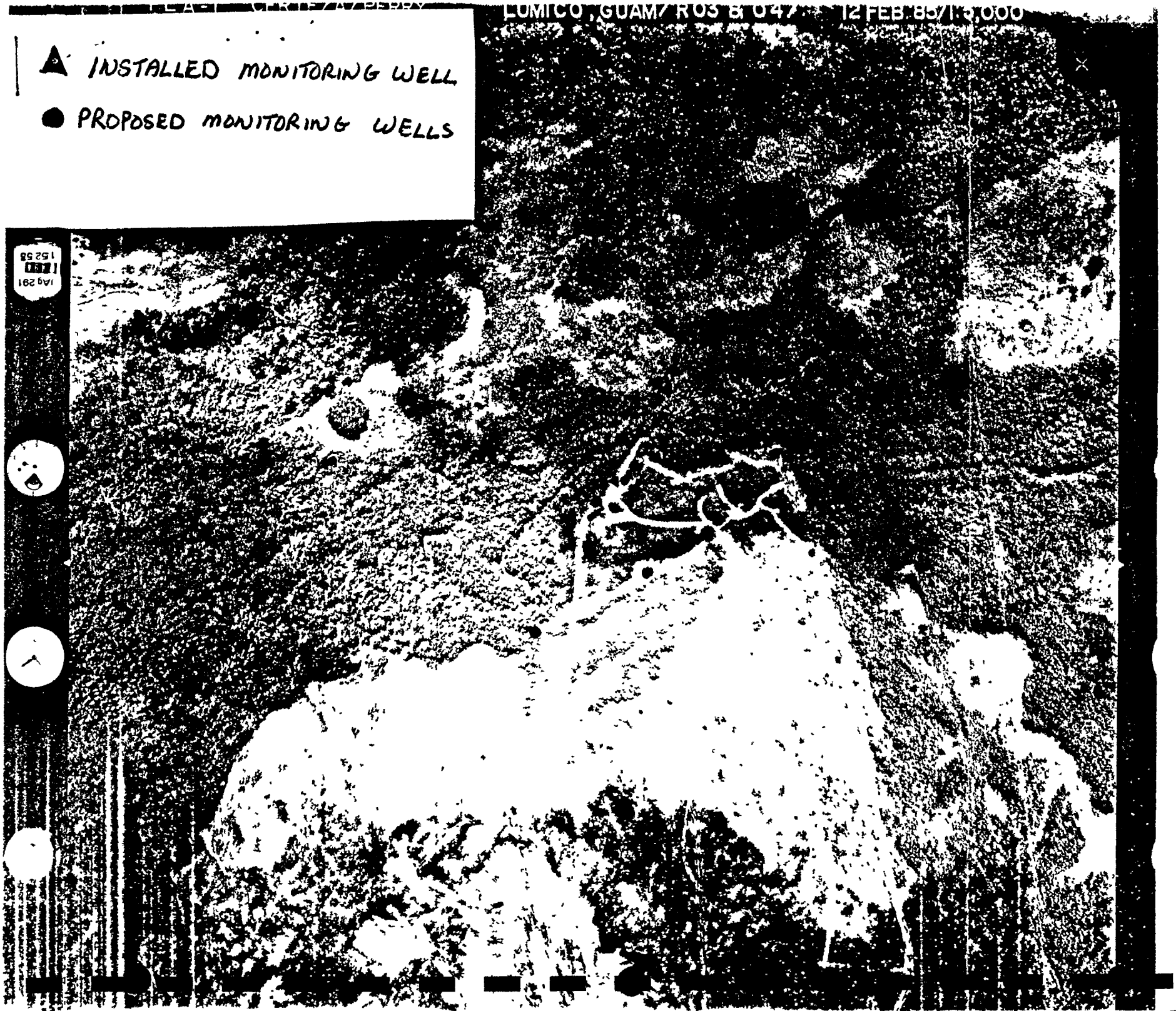
Black and Veatch Consulting Engineers. Unpublished. Draft report on Insular Territory Hazradous Waste Sites.

Chun, M. J. and G. L. Dugan. 1981. Environmental aspects of Kapaa landfill, Kawainui, Oaku, Hawaii. Univ. of Hawaii, Water Res. Research Center, Tech. Rept. No. 140. 66 p.

Council on Environmental Quality. 1981. Contamination of Groundwater by toxic organic chemical. In Environmental Quality-1981. U.S. Government Printing Office, Washington, D.C.

Falco, J. W. et al., 1982. A screening procedure for assessing the transport and degradiation of solid waste contituents in subsrface and surface waters. Environ. Toxical, Chem. 121.

Guam Environmental Protection Agency. 1979. 208-Water quailty management plan. Guam Environmental Protection Agency, Government of Guam, Agana.


▲ INSTALLED MONITORING WELL
● PROPOSED MONITORING WELLS